EXPOSURE ASSESSMENT APPROACHES FOR ARSENIC IN DRINKING WATER

Background and Aims

Accurate retrospective exposure assessment is a major challenge in conducting epidemiologic studies of environmental factors and diseases with long latency, such as cancer. For example, bladder cancer is typically diagnosed clinically late in life, but has an etiological relevant exposure period of decades. The aim of this study is to compare and contrast exposure assessment methodologies in recent cancer studies which attempted to classify lifetime exposure of arsenic.

Methods

Two studies were in the USA, and the third in Eastern Europe. Case/control ascertainment was from 11 counties in Michigan, 3 states in New England (NEBCS), and from parts of the countries Hungary, Romania, and Slovakia (ASHRAM). Methods for locating residences of the study population prior to diagnosis inside and out of the ascertainment areas, for linking these residences to their drinking water supply, and for predicting the level of arsenic in their supply over a lifetime exposure period are compared in this presentation.

Results

Arsenic concentration specific to residential water supplies were estimated for 99%, 95%, and 80% of the cumulative exposure periods across all study participants in the Michigan study (64,040 Exposure-Years), NEBCS (173,361 E-Y), and ASHRAM (94,008 E-Y), respectively. Average residential mobility was approximately 9 residences over the exposure period in the Michigan study, 7 in NEBCS, and not reported in ASHRAM. Concentrations varied widely across the locations of current and past residences in all studies, especially in terms of water supply source: private wells versus public supply (only reported in USA studies).

Conclusions

Accurately locating past residences in epidemiological studies concerning waterborne contaminants and diseases with long latency is critical to exposure assessment. Recent cancer studies demonstrate achievement of this step allows for estimating contaminant concentrations over much of the exposure period, thus accounting for exposure misclassification that could result from study population mobility.